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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,818	12/15/2003	Xuehua Wu	AVAN/001107	5390
47389 7590 01/04/2008 PATTERSON & SHERIDAN, LLP 3040 POST OAK BLVD SUITE 1500 HOUSTON, TX 77056			EXAMINER LI, SHI K	
			ART UNIT 2613	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/736,818

Applicant(s)

WU ET AL.

Examiner

Shi K. Li

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 July 2007 and 26 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/ are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

I. Applicant's election without traverse of Species I in the reply filed on 26 October 2007 is acknowledged. Claims 1-20 read on Species I; claims 8, 15 and 18 are generic to Species I and

II. Claim 21 has been withdrawn as being directed to non-elected invention. The election requirement is made final.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17 recites " $I=I_{\max}=I_0$ " and " $I=I_{\min}=0$ ".  $I$ ,  $I_{\max}$ ,  $I_0$  and  $I_{\min}$  are not defined.

### *Claim Rejections - 35 USC § 103*

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-3 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liou (U.S. Patent 6,292,299 B1) in view of Li et al. (U.S. Patent 6,707,960 B2) and Bosomworth (U.S. Patent 3,700,791).

Regarding claim 1, Liou discloses in FIG. 3 an optical device comprising an input port 355, an output port 365, thin film filter 100 and face 110 and other faces. Face 110 is coated with a reflective material 120. Liou teaches in FIG. 3 that the filter can move in the z direction.

FIG. 3 shows a pass-through state when the light beam hits the upper part of surface 110. It is understood that when the light beam hits the lower part with the reflector 120, light beam is blocked. It is also understood that when the filter moves in the z direction between a pass-through state and a blocking state, the light beam will hit the boundary between the upper surface and the lower surface (corresponding to transient state of instant claim). The differences between Liou and the claim invention are (a) Liou does not teach dual fiber collimator and (b) Liou does not teach the thickness of the reflector. Dual fiber collimator is well known in the art. For example, Li et al. teaches in FIG. 1A and FIG. 1B the use of dual fiber collimator in an application similar to Liou. By comparing FIG. 1A and FIG. 1B of Li et al. and FIG. 3 of Liou, one of ordinary skill in the art would have recognized that it is obvious to replace the two collimators 350 and 370 with a dual fiber collimator. One of ordinary skill in the art would have been motivated to combine the teaching of Li et al. with the optical device of Liou because a dual fiber collimator reduces space and simplifies alignment between the collimator and the filter. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a dual fiber collimator, as taught by Li et al., in the optical device of Liou because a dual fiber collimator reduces space and simplifies alignment between the collimator and the filter.

The combination of Liou and Li et al. still fails to teach the thickness of the reflector. Bosomworth teaches in col. 2, lines 57-60 that the thickness of each layer in a thin film mirror is a particular fraction or multiple of the wavelength at which the reflective-to-transmissive transition must occur. One of ordinary skill in the art would have been motivated to combine the teaching of Bosomworth with the modified optical device of Liou and Li et al. because the

principles are based on the physics of optics. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a thickness that is an integer multiple of the wavelength at which reflective-to-transmissive transition must occur for the reflector, as taught by Bosomworth; in the modified optical device of Liou and Li et al. because the principles are based on the physics of optics.

Regarding claim 2, Liou teaches the pass-through state.

Regarding claim 3, Liou teaches the blocking state.

Regarding claims 6-7, Liou teaches in col. 3, line 9 that the reflector 110 is a coating of gold.

6. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liou and Li et al. as applied to claims 1-3 and 6-7 above, and further in view of Pan et al. (U.S. Patent 5,742,712).

Liou and Li et al. have been discussed above in regard to claims 1-3 and 6-7. The difference between Liou and Li et al. and the claimed invention is that Liou and Li et al. do not teach a relay. Liou teaches using a positioner for moving the filter and Li et al. teaches mechanical pivot for moving the mirror. It is understood that any mechanical device can be used for moving the device as long as the device can provide adequate force and speed. Pan et al. teaches in FIG. 1 relay 12 for moving a filter in an apparatus similar to that of Liou and Li et al. One of ordinary skill in the art would have combined the teaching of Pan et al. with the modified optical device of Liou and Li et al. because the substitution of the known relay for a positioner or mechanical pivot would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Thus it would have been obvious to one of ordinary skill in the art at the

time the invention was made to use relay for moving the filter, as taught by Pan et al., in the modified optical device of Liou and Li et al. because the substitution of the known relay for a positioner or mechanical pivot would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

7. Claims 8 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liou (U.S. Patent 6,292,299 B1) in view of Scobey et al. (U.S. Patent 6,320,996 B1).

Regarding claim 8, Liou discloses in FIG. 3 an optical device comprising an input port 355, an output port 365, thin film filter 100 and face 110 and other faces. Face 110 is coated with a reflective material 120. Liou teaches in FIG. 3 that the filter can move in the z direction. FIG. 3 shows a pass-through state when the light beam hits the upper part of surface 110. It is understood that when the light beam hits the lower part with the reflector 120, light beam is blocked. It is also understood that when the filter moves in the z direction between a pass-through state and a blocking state, the light beam will hit the boundary between the upper surface and the lower surface (corresponding to transient state of instant claim). The difference between Liou and the claimed invention is that Liou does not teach the thickness of the reflector. Scobey et al. teaches in FIG. 2 a similar optical device. Scobey et al. teaches in col. 11, lines 38-39 that the reflector layer is typically between about 50-200 nm thick to achieve a signal loss of less than 0.1 dB. One of ordinary skill in the art would have been motivated to combine the teaching of Scobey et al. with the optical device of Liou because the thickness taught by Scobey et al. achieves very small signal loss. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose of thickness of 50-200 nm, as taught by

Scobey et al., in the optical device of Liou because the thickness taught by Scobey et al. achieves very small signal loss.

Regarding claims 18-19, Scobey et al. teaches FIG. 21 cascading two or more optical devices for dropping a plurality of wavelengths.

8. Claims 9-11 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liou and Scobey et al. as applied to claims 8 and 18-19 above, and further in view of Li et al. (U.S. Patent 6,707,960 B2).

Liou and Scobey et al. have been discussed above in regard to claims 8 and 18-19. The difference between Liou and Scobey et al. and the claimed invention is that Liou and Scobey et al. do not teach a dual fiber collimator. Dual fiber collimator is well known in the art. For example, Li et al. teaches in FIG. 1A and FIG. 1B the use of dual fiber collimator in an application similar to Liou. By comparing FIG. 1A and FIG. 1B of Li et al. and FIG. 3 of Liou, one of ordinary skill in the art would have recognized that it is obvious to replace the two collimators 350 and 370 with a dual fiber collimator. One of ordinary skill in the art would have been motivated to combine the teaching of Li et al. with the modified optical device of Liou and Scobey et al. because a dual fiber collimator reduces space and simplifies alignment between the collimator and the filter. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a dual fiber collimator, as taught by Li et al., in the optical device of Liou and Scobey et al. because a dual fiber collimator reduces space and simplifies alignment between the collimator and the filter.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liou and Scobey et al. as applied to claims 8 and 18-19 above, and further in view of Hubbard (U.S. Patent 5,506,053).

Liou and Scobey et al. have been discussed above in regard to claims 8 and 18-19. The difference between Liou and Scobey et al. and the claimed invention is that Liou and Scobey et al. do not teach using oxide for the reflector material. Hubbard teaches in col. 2, lines 53-59 that metals and metal oxides including gold, silver, indium oxide, tin oxide and indium tin oxide can be used for reflective layer for infrared light. One of ordinary skill in the art would have combined the teaching of Hubbard with the modified optical device of Liou and Scobey et al. because the substitution of the known oxide material for gold or silver as reflective layer would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use oxide as reflective material, as taught by Hubbard, in the modified optical device of Liou and Li et al. because the substitution of the known oxide material for gold or silver as reflective layer would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

10. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liou and Scobey et al. as applied to claims 8 and 18-19 above, and further in view of Pan et al. (U.S. Patent 5,742,712).

Liou and Scobey et al. have been discussed above in regard to claims 8 and 18-19. The difference between Liou and Scobey et al. and the claimed invention is that Liou and Scobey et al. do not teach a relay. Liou teaches using a positioner for moving the filter and Scobey et al.

teaches in FIG. 14 electromechanical actuator for moving the filter. It is understood that any mechanical device can be used for moving the device as long as the device can provide adequate force, accuracy and speed. Pan et al. teaches in FIG. 1 relay 12 for moving a filter in an apparatus similar to that of Liou and Li et al. One of ordinary skill in the art would have combined the teaching of Pan et al. with the modified optical device of Liou and Li et al. because the substitution of the known relay for a positioner or mechanical pivot would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use relay for moving the filter, as taught by Pan et al., in the modified optical device of Liou and Li et al. because the substitution of the known relay for a positioner or mechanical pivot would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

11. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liou (U.S. Patent 6,292,299 B1) in view of Baumeister et al. (U.S. Patent 5,333,090).

Regarding claim 15, Liou discloses in FIG. 3 an optical device comprising an input port 355, an output port 365, thin film filter 100 and face 110 and other faces. Face 110 is coated with a reflective material 120. Liou teaches in FIG. 3 that the filter can move in the z direction. FIG. 3 shows a pass-through state when the light beam hits the upper part of surface 110. It is understood that when the light beam hits the lower part with the reflector 120, light beam is blocked. It is also understood that when the filter moves in the z direction between a pass-through state and a blocking state, the light beam will hit the boundary between the upper surface and the lower surface (corresponding to transient state of instant claim). The difference between Liou and the claimed invention is that Liou does not teach the thickness of the reflector.

Baumeister et al. teaches in FIG. 5 the relation between thickness and loss. Baumeister et al. teaches in col. 5, line s40-41 that the preferable thickness is  $(2N-1)\lambda_L/8$ . One of ordinary skill in the art would have been motivated to combine the teaching of Baumeister et al. with the optical device of Liou because it gives minimal loss. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose a thickness as taught by Baumeister et al. in the optical device of Liou because it gives minimal loss.

Regarding claims 16-17, the equation  $t(\sin\theta)=n\lambda$  is an inherent characteristic based on optics.

### ***Response to Arguments***

12. Applicant's arguments filed 27 July 2007 have been fully considered but they are not persuasive.

The Applicant argues that the Liou discloses a tunable optical filter that requires the filter to move along at least two axes in order to operate. The Examiner disagrees. Liou teaches in FIG. 3 that the filter can move in z direction and x direction. The wavelength that passes through the filter in the pass-through mode depends on the filter in the x axis. The filter position in the z direction determines whether the filter is in the pass-through mode or blocking mode. Either Liou expressly teaches the above or it is obvious to one of ordinary skill in the art. For example, Liou teaches in FIG. 2, step 210 movement along a constant wavelength channel line (i.e., the z axis).

### ***Conclusion***

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (7:30 a.m. - 4:30 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

skl  
2 January 2008



Shi K. Li  
Patent Examiner